Peirce Secondary School 2022 S4 Preliminary Examination

Solutions for 2022 4E Prelim Science Chemistry

MCQ

1. A	2. C	3. D	4. C	5. D
6. D	7. A	8. C	9. C	10.B
11.B	12.C	13.A	14.B	15.A
16.C	17.D	18.D	19.B	20.B

Section	A	
1(a)	Chromatography	[1]
1(b)	Any height below the starting line.	[1]
1(c)	Yes. It contains only permitted dyes.	[1]
1(d)	To check if athletes consumed banned drugs. or	
	To check the vegetables contained too much pesticides	[1]
	Total 4 Marks	
2	A: dilute sulfuric acid / H ₂ SO ₄	[1]
	B: barium sulfate/ BaSO4	[1]
	C: ammonium sulfate / (NH ₄) ₂ SO ₄	[1]
	D: ammonia	[1]
	Total 4 Marks	
3(a)	D	[1]
3(b)	F	[1]
3(c)	С	[1]
3(d)	В	[1]
3(e)	C	[1]
	Total 5 Marks	

4(a)	Number of protons 12		[2]
	Number of neutrons 25-12	= 13	
	Number of electrons 12		
	3 correct 2 mks. less than 3 cor	rect 1mk	
(1.1)			
(bi)			[1]
			[2]
	1 mk for each ion		
	Total 6 Marks		
5(ai)	1+14+3(16) = 63		[1]
5(aii)	$126/63 = 2 \text{ mol/dm}^3$		[1]
5(b)	No. of moles of magnesium carl	bonate = $\frac{1}{2} \times 1 = 0.5 \text{ mol}$	[1]
	Total 3 Marks		
6(ai)	$CaCO_3$ (s) + H ₂ SO ₄ (aq) \rightarrow CaS	SO ₄ (s) + H ₂ O (l) + CO ₂ (g) OR	[2]
	CaO (s) + H ₂ SO ₄ (aq) \rightarrow CaSO	4 (s) + H ₂ O (l)	
	Equation 1 mk		
- (S.S 1 mk		
6(aii)	Filter the mixture and		[3]
	Collect the residue.		
	Rinse with distilled water and		
	Dry between sheets of filter pap	er.	
	4 steps 3 mks; 3 steps 2 mks; 2	steps 1mk	
6(bi)	Substance oxidised: Fe		[1]
	Reason: oxidation state of Fe increases from 0 in Fe to +2 in FeSO ₄		[1]
6(bii)	Substance reduced: H ₂ SO ₄		[1]
	Total 0 Marks	creases from +6 in H_2SO_4 to +4 in SO_2	
1			

7(a)	Bromine / Br ₂	[1]
7(b)	7	[1]
7(c)	X ₂	[1]
7(d)	Any value more than 216 pm	[1]
7e(i)	LiX	[1]
7e(ii)	CX4	[1]
	Total 6 Marks	
8(a)	X: naphtha	[2]
	Y: kerosene	
	Z: lubricating oil	
	All correct 2 mks; less than 3 correct 1 mk	
8(b)	$C_6H_{14} \rightarrow C_4H_{10} + \underline{C_2H_4}$	[1]
8(ci)	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	[1]
8(cii)	it produces toxic fumes when burnt.	[1]
	Total 4 Marks	
9(a)	Test: Bubble butane and butene to aqueous bromine Results: Reddish brown aqueous bromine decolourise by butene rapidly Aqueous bromine remains unchanged by butane	[1]
	Test: 1mk	[1]
	Results: 1mk	
9(b)	List of substances and conditions: yeast, glucose (solution), Less than 37°C	[1]
	Chemical Equation: $C_6H_{12}O_6 \rightarrow 2 CH_3CH_2OH + 2 CO_2$	[1]
	Total 4 Marks	



11(ai)	$TiCl_4 + 2 Mg \rightarrow 2 MgCl_2 + Ti$	[1]
11(aii)	magnesium	[1]
11(b)	Ti V AI	[1]
	Note: ratio of Ti atoms: V atoms: Al atoms is 8: 1:1 estimated In pure titanium, it is made of atoms of the same sizes. In titanium alloy, atoms of different sizes disrupt the order arrangement and prevent the layers from sliding.	[1] [1]
11(c)	Silvery / low density	[1]
	Reject shiny as this phrase is not used to describe group I metals in syllabus	
11(di)	$Fe_2O_3 + 3 CO \rightarrow 2 Fe + 3 CO_2$	[1]
11(dii)	Recycling is the process of smelting, collecting and remaking metals in new blocks of iron.	[1]
11(diii)	It saves costs / it conserves limited resources.	[1]
11(div)	Painting/oiling/greasing/plastic coating and any other scientifically correct answers.	[1]
	Total 10 Marks	

12(ai)	Village B	[1]
12(aii)	Pollutants 1: methane	
	Pollutants 2: oxides of nitrogen OR sulfur dioxide	[1]
12(bi)		[1]
	0	
	arrangement	
	of particles	
12(bii)	Amount of energy: particles possess highest/largest amount of energy	[1]
()	Movement: particles move/travel fast and random	[1]
	Arrangement: particles are far apart and disorderly	[1]
12(ci)	Decreases pH of water bodies causing death of aquatic animals/ decrease	[1]
	pH of soil leading to unable to support farming / corrode metal/limestone	
	structures.	
	Accept any other scientifically correct answers.	
12(cii)	General formula: C _n H _{2n+1} COOH	[1]
	Structural formula:	[1]
	ΗO	
	H-C-C	
	н Ò—н	
	Accept drawing that is not full structural formula	
	Total 10 Marks	